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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Gitis et al.
Assignee: Maxtor Corporation
Title: MAGNETIC HEAD SLIDER WITH RESISTANCE TO DEBRIS
ACCUMULATION
Serial No.: 09/991,855 Filed: November 20, 2001
Examiner: Ometz, D. Group Art Unit: 2651
Atty. Docket No.: 3123-149-1-1

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

**APPEAL BRIEF
(37 C.F.R. § 1.192)**

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal filed concurrently herewith.

Please charge the \$320 fee for filing this Appeal Brief to Deposit Account No. 13-0016/149-1 and charge any underpayment or credit any overpayment to this Account.

This paper is submitted in triplicate.

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Maxtor Corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.¹

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

Claims in the application are: 1-71

B. Status of All Claims

1. Claims canceled: 1-4, 17-19, 23-28, 41-47, 51-53, 62 and 65
2. Claims pending: 5-16, 20-22, 29-40, 48-50, 54-61, 63, 64 and 66-71
3. Claims withdrawn: NONE
4. Claims allowed: 71 (claims 12 and 14 are objected to)
5. Claims rejected: 5-11, 13, 15, 16, 20-22, 29-40, 48-50, 54-61, 63, 64 and 66-70.

¹ It should perhaps be noted that the captioned-application is a divisional of U.S. Application Serial No. 09/491,284 filed January 26, 2000 in which an appeal is pending. Applicant does not believe the issues in the instant appeal and the '284 application appeal are related or affect one another.

It should perhaps also be noted that the '284 application is a continuation of U.S. Application Serial No. 08/161,234 filed December 2, 1993 (U.S. Pat. No. 6,084,743) in which the Board of Patent Appeals and Interferences issued a Decision dated September 2, 1999 (Appeal No. 97-2035).

C. Claims on Appeal

Claims on appeal are: 5-11, 13, 15, 16, 20-22, 29-40, 48-50, 54-61, 63, 64
and 66-70

IV. STATUS OF AMENDMENTS

No amendments have been filed after the outstanding Office Action dated June 12, 2002.

V. SUMMARY OF INVENTION

The present invention is generally directed to a recording head (or slider) used in a hard disk drive (page 2, lines 6-8; page 5, lines 3-4). One of the problems associated with sliders which maintain substantially continuous contact with the disk surface during read/write operations is that a substantial amount of debris is generated by the sliding action of the slider against the disk surface (page 2, lines 23-25). Dust and dirt can accumulate on the slider, leading to adverse effects such as signal modulation and increased wear (page 2, line 25 to page 3, line 5). Debris accumulation is also a significant problem with near-contact sliders that fly above the disk surface (page 3, lines 6-16).

The present invention generally solves this problem by providing a slider that includes rails that extend towards the disk surface during read/write operations. The rails each include a leading edge with a narrower width than the trailing edge (page 5, lines 20-25). Shaping the rails in this manner pushes debris away from the slider and removes debris away from the slider by means of the hydrodynamic air flow (page 10, lines 11-21).

In various embodiments, the rails can have a V-shape (slider 50 with rails 52 with leading edge 55 and trailing edge 54, page 10, lines 6-21, Figures 5A, 5B and 5C), a

wedge-shape tip and a rectilinear portion (slider 60 with rails 62 with leading edge 65 and trailing edge 64, page 11, lines 7-15, Figure 6A), a V-shape tip and a rectilinear portion (slider 70 with rails 72 with leading edge 75 and trailing edge 74, page 11, lines 16-21, Figure 6B), a U-shape tip and a rectilinear portion (slider 80 with rails 82 with leading edge 85 and trailing edge 84, page 11, lines 22 to page 12, line 1, Figure 6C), or other shapes (page 12, lines 1-3).

VI. ISSUES

The issues on appeal are:

1. Whether claims 5, 6, 9-11, 15, 16, 20-22, 30-33 and 35-38 should be rejected under 35 U.S.C. § 102(b) as being anticipated by *JP 02-101687*;
2. Whether claim 70 should be rejected under 35 U.S.C. § 102(b) as being anticipated by *JP 63-136370*;
3. Whether claims 40, 48-50, 54-61, 63, 64, 67 and 68 should be rejected under 35 U.S.C. § 102(b) as being anticipated by *Inumochi* (U.S. Patent No. 4,939,603);
4. Whether claims 7 and 8 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *JP 02-101687* in view of *Inumochi*;
5. Whether claims 13, 29 and 34 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *JP 02-101687* in view of *Yoneoka* (U.S. Patent 5,212,608);
6. Whether claim 66 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Inumochi* in view of *Yoneoka*; and
7. Whether claims 39 and 69 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Inumochi* or *JP 02-101687* in view of *Morita et al.* (U.S. Patent 5,080,948).

VII. GROUPING OF CLAIMS

For the first issue, the claims are grouped as follows: (i) claims 5, 6, 9-11, 15, 16, 20, 21, 30-33 and 35-38, and (ii) claim 22.

For the second issue, claim 70 is the sole claim.

For the third issue, the claims are grouped as follows: (i) claims 40, 48-50, 54-60, 63, 64, 67 and 68, and (ii) claim 61.

For the fourth issue, claims 7 and 8 stand and fall together.

For the fifth issue, the claims are grouped as follows: (i) claims 29 and 34, and (ii) claim 13.

For the sixth issue, claim 66 is the sole claim.

For the seventh issue, the claims are grouped as follows: (i) claim 39, and (ii) claim 69.

VIII. ARGUMENTS

1. SECTION 102 REJECTIONS – JP 02-101687

Claims 5, 6, 9-11, 15, 16, 20-22, 30-33 and 35-38 are rejected under 35 U.S.C. § 102(b) as being anticipated by *JP 02-101687*.

Claims 5, 6, 9-11, 15, 16, 20, 21, 30-33 and 35-38 (Group I)

JP 02-101687 discloses a slider with two rails. In Figure 1, the leading edge is a pointed tip that is aligned with an outer side surface of the body. In Figure 2, the leading edge has the same width as the trailing edge. In Figure 3, the leading edge is a pointed tip that is spaced from the body. Figures 4(a), 4(b) and 4(c) appear to be alternate views of Figures 2 and 3.

Claim 5 recites that “said leading edge has a narrower width as compared to said trailing edge, extends to said body, is spaced from outer side surfaces of said body, and is not part of a flat surface.” Since the leading edge is spaced from the outer side surfaces of the body, this distinguishes over Figure 1. Since the leading edge has a narrower width as compared to the trailing edge, this distinguishes over Figure 2. Since the leading edge extends to the body, this distinguishes over Figure 3.

Claim 10 recites that “the width of the leading edge is substantially narrower than the width of the trailing edge, and the leading edge is a pointed tip that extends to the body and is spaced from outer side surfaces of the body.” Since the leading edge is spaced from the outer side surfaces of the body, this distinguishes over Figure 1. Since the leading edge is substantially narrower than the trailing edge, this distinguishes over Figure 2. Since the leading edge extends to the body, this distinguishes over Figure 3.

Claim 22 (Group II)

Claim 22 distinguishes over *JP 02-101687* for the reasons set forth above for claim 10.

Furthermore, claim 22 recites “each of the rails includes a rectilinear portion between the wedge-shaped portion and the trailing edge, and the narrow part of the wedge-shaped portion is aligned with an inner side of the rectilinear portion and spaced from an outer side of the rectilinear portion.” *JP 02-101687* discloses a rail in which the narrow part of the wedge-shaped portion is aligned with an outer side of the rectilinear portion and spaced from an inner side of the rectilinear portion in Figure 1, a rail without a wedge-shaped portion in Figure 2, and a rail in which the narrow part of the wedge-shaped portion is spaced from the inner and outer sides of the rectilinear portion in Figure 3.

Unfortunately, the Examiner has not even attempted to address this limitation. Moreover, the Examiner allowed claim 71, and claim 22 includes all the limitations of claim 71 as well as additional limitations.

Under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02.

2. SECTION 102 REJECTION – JP 63-136370

Claim 70 is rejected under 35 U.S.C. § 102(b) as being anticipated by *JP 63-136370*.

JP 63-136370 discloses a slider with two rails. The leading edge of the rails is a flat surface with a width S1.

Claim 70 recites that “each of the rails includes a V-shaped portion, a narrow part of the V-shaped portion is the leading edge and a wide part of the V-shaped portion is the trailing edge.” *JP 63-136370* discloses rails in which the leading edge is a flat surface. Therefore, the leading edge is not the narrow part of a V-shaped portion. This distinguishes over *JP 63-136370*.

3. SECTION 102 REJECTIONS – INUMOCHI

Claims 40, 48-50, 54-61, 63, 64, 67 and 68 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Inumochi* (U.S. Patent No. 4,939,603).

Claims 40, 48-50, 54-60, 63, 64, 67 and 68 (Group I)

Inumochi discloses a slider with two rails. Each of the rails includes air-bearing surface 2 and taper 3. Taper 3 is shaped as a projection facing a magnetic medium. Convex imaginary ridge 8 is formed by an intersection between the air-bearing surface 2 and the taper 3. However, ridge 8 is not a leading edge of the rail. Rather, ridge 8 is spaced distance L_1 from the leading edge of the rail. Figure 2A, taken along line IIA—IJA in Figure 1, confirms that the leading edge of the rail has the same width as the trailing edge of the slider.

Claim 40 recites that “the leading edge is narrower than the trailing edge.” This distinguishes over *Inumochi*.

Claim 61 (Group II)

Claim 61 distinguishes over *Inumochi* for the reasons set forth above for claim 40.

Furthermore, claim 61 recites “the body has first and second outer side surfaces, the leading edge of the first rail does not extend to the first outer side surface, the trailing edge of the first rail extends to the first outer side surface, the leading edge of the second rail does not extend to the second outer side surface, and the trailing edge of the second rail extends to the second outer side surface.” *Inumochi* discloses a rail in which the leading edge extends to the outer side surface of the slider body.

Unfortunately, the Examiner has not even attempted to address this limitation.

4. SECTION 103 REJECTIONS – JP 02-101687 AND INUMOCHI

Claims 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 02-101687 in view of *Inumochi*.

In sustaining this rejection, the Examiner asserts that it would be obvious to replace the V-shaped rails in JP 02-101687 with the U-shaped rails in *Inumochi*.

Applicant disagrees. *Inumochi* fails to teach or suggest placing the U-shaped portion at the leading edge. Instead, the U-shaped portion provided by ridge 8 is spaced from the leading edge by taper 3.

5. SECTION 103 REJECTIONS – JP 02-101687 AND YONEOKA

Claims 13, 29 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 02-101687 in view of *Yoneoka* (U.S. Patent 5,212,608).

Claims 29 and 34 (Group I)

In sustaining this rejection, the Examiner asserts that it would be obvious to provide flat rails in JP 02-101687 in view of *Yoneoka*.

Even if this modification is made, claims 29 and 34 distinguish over JP 02-101687 in view of *Yoneoka* for the reasons set forth above for claim 10.

Claim 13 (Group II)

Claim 13 depends from claim 12, and claim 12 is indicated as allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. Therefore, the rejection of claim 13 is clearly erroneous.

6. SECTION 103 REJECTION – INUMOCHI AND YONEOKA

Claim 66 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Inumochi* in view of *Yoneoka*.

In sustaining this rejection, the Examiner asserts that it would be obvious to provide flat rails in *Inumochi* in view of *Yoneoka*.

Applicant disagrees. *Inumochi* discloses that the U-shaped portion provided by ridge 8 is spaced from the leading edge by taper 3. Taper 3 is fundamental to the slider and its satisfactory operation.

If the proposed modification would render the prior art unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification (M.P.E.P. § 2143.01).

7. SECTION 103 REJECTIONS – INUMOCHI/JP 02-101687 AND MORITA ET AL

Claims 39 and 69 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Inumochi* or *JP 02-101687* in view of *Morita et al.* (U.S. Patent 5,080,948).

Claim 39 (Group I)

Claim 39 distinguishes over *Inumochi* or *JP 02-101687* in view of *Morita et al.* for the reasons set forth above for claim 10.

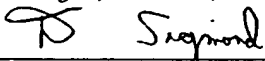
Claim 69 (Group II)

Claim 69 distinguishes over *Inumochi* or *JP 02-101687* in view of *Morita et al.* for the reasons set forth above for claim 40.

8. CONCLUSION

For the reasons given above, Applicant respectfully submits that claims 5-11, 13, 15, 16, 20-22, 29-40, 48-50, 54-61, 63, 64 and 66-70 are in condition for allowance and respectfully requests that the outstanding rejections be overturned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on June 24, 2002.

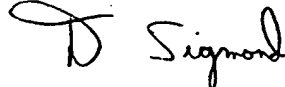


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IX. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1 5. A slider for supporting a magnetic transducer above the surface of a
2 rotating disk medium, said slider comprising:
3 a body;
4 a plurality of rail members extending outward from said body in a direction
5 towards said medium, each of said rail members having a leading and a trailing edge with
6 said leading edge facing in the general direction of relative motion between said
7 transducer and said medium, and wherein said leading edge has a narrower width as
8 compared to said trailing edge, extends to said body, is spaced from outer side surfaces of
9 said body, and is not part of a flat surface;
10 each of said rail members also having an air-bearing surface which is alternately
11 brought into contact with and separated from said surface of said medium, said air-
12 bearing surface being generally parallel to said surface of said medium.

1 6. The slider of Claim 5 wherein each of said rail members has a V-shape,
2 with the narrow part of said V-shape pointing in said direction.

1 7. The slider of Claim 5 wherein each of said rail members has a U-shape,
2 with the narrow part of said U-shape pointing in said direction.

1 8. The slider of Claim 5 wherein each of said rail members has a parabolic
2 shape, with the narrow part of said parabolic shape pointing in said direction.

1 9. The slider of Claim 5 wherein said leading edges are tapered away from
2 said air-bearing surfaces to create a lifting effect to maintain said body at a predetermined
3 height above said surface of said medium.

1 10. A slider, comprising:
2 a body;
3 a transducer for transferring information to and from a rotating disk medium
4 during read and write operations; and
5 first and second rails, wherein each of the rails has a leading edge that faces into a
6 general direction of relative motion between the slider and the medium, a trailing edge
7 that faces away from the direction, and an air-bearing surface, the leading edge has a
8 width that is substantially perpendicular to the direction, the trailing edge has a width that
9 is substantially perpendicular to the direction, the width of the leading edge is
10 substantially narrower than the width of the trailing edge, and the leading edge is a
11 pointed tip that extends to the body and is spaced from outer side surfaces of the body.

1 11. The slider of Claim 10 wherein each of the rails includes a V-shaped
2 portion, a narrow part of the V-shaped portion is the leading edge and a wide part of the
3 V-shaped portion is spaced from the leading edge.

1 13. The slider of Claim 12 wherein a thickness of the narrow part of the V-
2 shaped portion is substantially identical to a thickness of the wide part of the V-shaped
3 portion.

1 15. The slider of Claim 11 wherein the wide part of the V-shaped portion is
2 spaced from the trailing edge.

1 16. The slider of Claim 15 wherein a distance between the narrow part of the
2 V-shaped portion and the wide part of the V-shaped portion is substantially less than a
3 distance between the wide part of the V-shaped portion and the trailing edge.

1 20. The slider of Claim 10 wherein each of the rails includes a wedge-shaped
2 portion, a narrow part of the wedge-shaped portion is the leading edge and a wide part of
3 the wedge-shaped portion is spaced from the leading edge.

1 21. The slider of Claim 20 wherein the wide part of the wedge-shaped portion
2 is spaced from the trailing edge.

1 22. The slider of Claim 20 wherein each of the rails includes a rectilinear
2 portion between the wedge-shaped portion and the trailing edge, and the narrow part of
3 the wedge-shaped portion is aligned with an inner side of the rectilinear portion and
4 spaced from an outer side of the rectilinear portion.

1 29. The slider of Claim 10 wherein the air-bearing surface is a flat continuous
2 surface.

1 30. The slider of Claim 10 wherein the slider has a leading edge that faces into
2 the direction and a trailing edge that faces away from the direction, the leading edge of
3 each of the rails extends to the leading edge of the slider, and the trailing edge of each of
4 the rails extends to the trailing edge of the slider.

1 31. The slider of Claim 10 wherein the slider has first and second outer side
2 surfaces, each of the rails has an outer side surface, a portion of the outer side surface of
3 the first rail extends to the first outer side surface of the slider, and a portion of the outer
4 side surface of the second rail extends to the second outer side surface of the slider.

1 32. The slider of Claim 10 wherein each of the rails has an inner and outer
2 surface and the leading edge is symmetrically disposed between the inner and outer
3 surfaces.

1 33. The slider of Claim 10 wherein each of the rails has an inner surface and
2 outer surface and the leading edge is asymmetrically disposed between the inner and
3 outer surfaces.

1 34. The slider of Claim 10 wherein each of the rails has a uniform thickness.

1 35. The slider of Claim 10 wherein each of the rails has a non-uniform
2 thickness.

1 36. The slider of Claim 10 wherein each of the rails deflects debris on the
2 medium away from the air-bearing surface.

1 37. The slider of Claim 10 wherein each of the rails alternately contacts and
2 moves away from the medium during the read and write operations.

1 38. The slider of Claim 10 wherein each of the rails maintains near-contact
2 with the medium during the read and write operations.

1 39. The slider of Claim 10 wherein each of the rails maintains a near-contact
2 flying height in the range of 1 to 3 microinches during the read and write operations.

1 40. A slider, comprising:
2 a body;
3 a transducer for transferring information to and from a rotating disk medium
4 during read and write operations; and
5 first and second rails that extend from the body towards the medium, wherein
6 each of the rails has a leading edge that is part of a curved surface and faces into a general
7 direction of relative motion between the slider and the medium, a tapered width adjacent
8 to the leading edge, a trailing edge that faces away from the direction, and an air-bearing
9 surface that faces the medium, the leading edge, trailing edge and tapered width extend
10 between the air-bearing surface and the body, and the leading edge is narrower than the
11 trailing edge.

1 48. The slider of Claim 40 wherein each of the rails includes a U-shaped
2 portion, a narrow part of the U-shaped portion is the leading edge and a wide part of the
3 U-shaped portion is spaced from the leading edge.

1 49. The slider of Claim 48 wherein the wide part of the U-shaped portion is
2 spaced from the trailing edge.

1 50. The slider of Claim 48 wherein each of the rails includes a rectilinear
2 portion between and adjacent to the U-shaped portion and the trailing edge.

1 54. The slider of Claim 40 wherein each of the rails includes a parabolic-
2 shaped portion, a narrow part of the parabolic-shaped portion is the leading edge and a
3 wide part of the parabolic-shaped portion is spaced from the leading edge.

1 55. The slider of Claim 54 wherein the wide part of the parabolic-shaped
2 portion is spaced from the trailing edge.

1 56. The slider of Claim 54 wherein each of the rails includes a rectilinear
2 portion between and adjacent to the parabolic-shaped portion and the trailing edge.

1 57. The slider of Claim 40 wherein each of the rails has a hyperbolic-shaped
2 portion, a narrow part of the hyperbolic-shaped portion is the leading edge and a wide
3 part of the hyperbolic-shaped portion is spaced from the leading edge.

1 58. The slider of Claim 57 wherein the wide part of the hyperbolic-shaped
2 portion is spaced from the trailing edge.

1 59. The slider of Claim 57 wherein each of the rails includes a rectilinear
2 portion between and adjacent to the hyperbolic-shaped portion and the trailing edge.

1 60. The slider of Claim 40 wherein the body has a leading edge that faces into
2 the direction and a trailing edge that faces away from the direction, the leading edge of
3 each of the rails extends to the leading edge of the body, and the trailing edge of each of
4 the rails extends to the trailing edge of the body.

1 61. The slider of Claim 40 wherein the body has first and second outer side
2 surfaces, the leading edge of the first rail does not extend to the first outer side surface,
3 the trailing edge of the first rail extends to the first outer side surface, the leading edge of
4 the second rail does not extend to the second outer side surface, and the trailing edge of
5 the second rail extends to the second outer side surface.

1 63. The slider of Claim 40 wherein the tapered width extends across a
2 minority of a distance between the leading and trailing edges.

1 64. The slider of Claim 40 wherein each of the rails has an inner and outer
2 surface and the leading edge is symmetrically disposed between the inner and outer
3 surfaces.

1 66. The slider of Claim 40 wherein each of the rails has a uniform thickness
2 between the leading and trailing edges.

1 67. The slider of Claim 40 wherein each of the rails has a first thickness at the
2 leading edge, a second thickness at the trailing edge, and the first thickness is less than
3 the second thickness.

1 68. The slider of Claim 40 wherein each of the rails maintains near-contact
2 with the medium during the read and write operations.

1 69. The slider of Claim 40 wherein each of the rails maintains a near-contact
2 flying height in the range of 1 to 3 microinches during the read and write operations.

1 70. A slider, comprising:
2 a transducer for transferring information to and from a rotating disk medium
3 during read and write operations; and
4 first and second rails, wherein each of the rails has a leading edge that faces into a
5 general direction of relative motion between the slider and the medium, a trailing edge
6 that faces away from the direction, and an air-bearing surface, the leading edge has a
7 width that is substantially perpendicular to the direction, the trailing edge has a width that
8 is substantially perpendicular to the direction, and the width of the leading edge is
9 substantially narrower than the width of the trailing edge, each of the rails includes a V-
10 shaped portion, a narrow part of the V-shaped portion is the leading edge and a wide part
11 of the V-shaped portion is the trailing edge.